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Heart Rate Monitor

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SENIOR DESIGN
TECHNICAL REPORT OF A
HEART RATE MONITOR

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ABSTRACT
OF A
HEART RATE MONITOR
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This project is a Heart Rate Monitor, which allows a person to take their pulse while engaged in physical activity. The requirements of the project are: to detect a heart beat, to display the heart rate in beats per minute, and to be easily carried by a person while exercising.

Operation of the Heart Rate Monitor has three main components: heart beat detection, signal processing, and heart rate display. Heart beat is indirectly monitored by detecting the blood flow through the capillaries in the palmer surface of the fingertip. Each time the heart pumps, blood is circulating through the capillaries in the fingertips giving a pulsating sensation that can be detected. An infrared (IR) LED and an IR photo-transistor pressed against a fingertip is used to sense the blood flow. As blood is forced into the capillaries, the amount of IR light received at the photo-detector changes. Change in received light causes a change in the output of the photo transistor that is AC coupled to op-amp buffer. This signal is then filtered, amplified, and converted into a TTL signal.

TTL signals are input into an 8749 Microcontroller. The input signals are processed through software to produce a number in beats per minute, that is BCD coded, to be output to a ICM7211 display driver.

The ICM7211 is a four digit nonmultiplexed seven segment display driver. It is connected to a 4-digit 7-segment display that displays the heart rate in beats per minute.